go up to the same place with a lot of Arecoonas, who are to build us a house, in which we intend to stop for a week or as much longer as we may find desirable. I may mention that we have already seen, close to where our house is to be, a place where the mountain *seems* accessible; but it looks so easy that I am convinced that it is impossible at that point."

BENJAMIN SILLIMAN

DURING the American War of Independence many men were called on to leave peaceful pursuits and adopt the profession of arms. Among these men was a well-known lawyer of New Haven in Connecticut, Gold Selleck Silliman by name. Lawyer Silliman became Brigadier-General Silliman. As the British troops advanced in the direction of New Haven the family of the General left their native place and settled in North Stratford, now called Trumbull. In this town Benjamin Silliman, the father of him whose death was recently recorded in these columns, was born in 1779.

Benjamin Silliman, sen., was a central figure in the group of pioneers of natural science in the United States. In 1818 he commenced the *American Journal of Science and Arts*, which continues to the present day to hold a leading position among the scientific journals of America. Two years before this date—that is, in 1816—Benjamin Silliman, jun., was born, at New Haven, where the Silliman family had so long had their home. The younger Silliman graduated at Yale College in 1837; and in the following year he began to teach chemistry, mineralogy, and geology. In 1846 he was appointed Professor of Applied Chemistry in the Sheffield Scientific School in connection with Yale College. The scientific work of Benjamin Silliman seems to have fairly begun about this time; according to the Royal Society's Catalogue, his first paper, "On the Use of Carbon in Grove's Battery," was published in 1842. From that time until his death he was an active worker in the advancement of science. During the years 1849-54 Silliman was Professor of Toxicology in the University of Louisville, Kentucky; in the latter year he returned to Yale College, to succeed his father as Professor of Chemistry. Here he remained until January 13 last, when he "went over to the majority."

Prof. Silliman did not publish any original memoirs, involving experimental work, of first-rate importance; like his father, he was distinguished rather as an organiser and teacher than as an investigator. For many years he acted as Secretary and Editor of the *Proceedings* to the American Association for the Advancement of Science. In 1838 he became associated with his father as joint editor of the *American Journal of Science;* in this capacity he exercised a great and beneficial influence in all matters connected with natural science in his own country.

The journal of which Sillimann was an editor contains about seventy papers from his pen; the greater number deal with mineralogical or chemico-mineralogical subjects, but he also wrote on such topics as glacier-motion, Australian wines, petroleum, temperature of flames, &c. He likewise furnished the *Journal* with many reviews of books and reports on the progress of various branches of natural science.

He published a book on the "First Principles of Chemistry," and another on the "Principles of Physics."

In his capacity as a public lecturer on scientific subjects, Silliman helped to guide the general opinion of his fellow-citizens in these matters in the right direction. It may indeed be said that his life-work was to form a connecting link between those who had devoted themselves to original investigation in natural science and the general outside world, which, while interested in science, requires a judicious and trustworthy middleman to interpret the meaning of the work that is being done for humanity by the students of nature in the inner shrine.

M. M. P. M.

MASAI LAND[1]

MR. THOMSON has not kept us waiting long for the story of his journey through a region of Africa which, so far as is known, had not previously been visited by any white man. Kilimanjaro itself was seen for the first time by Rebmann. After him Krapf, New, Von der Decken, Hildebrandt, and Wakefield, penetrated to the borders of the region which has been explored by Mr. Thomson, New alone being able to reach the snow-line on Kilimanjaro. Kenia, though doubtfully sighted by Krapf from afar, had never been approached. Mr. Thomson had thus a virgin field before him when he arrived at Zanzibar in the beginning of 1883, and the enterprise intrusted to him by the Royal Geographical Society he carried out in a manner and with results that will add much to the reputation which he achieved on his first expedition to Tanganyika. Mr. Thomson's instructions were to ascertain if a practicable direct route for European travellers exists through the Masai country from any one of the East African ports to Victoria Nyanza, and to examine Mount Kenia; to gather data for constructing as complete a map as possible in a preliminary survey; and to make all practicable observations regarding the meteorology, geology, natural history, and ethnology of the regions traversed. These objects Mr. Thomson never lost sight of, and, considering the means at his command, the time at his disposal, and the blackguardly crew he had to be content with as followers, are even more than might have been expected. Mr. Thomson is first of all a geologist, and no region in Africa is of more interest from a geological standpoint. He knows, moreover, enough of natural history to enable him to observe the flora and fauna of a country intelligently, and the value of his botanical collections has already been pointed out in our pages by Sir Joseph Hooker. For geographical observations he was even better fitted than in his previous expedition, and as for ethnology he found himself among a people unlike anything he had ever heard of in Africa, and in whom he took the intensest interest. Thus for the scientific reader the volume abounds with interest, and, as Mr. Thomson has no end of hunting and other stories of adventure to tell, his book is sure to be popular, especially as he is a skilful storyteller, abounding with a strong feeling of humour, or at least for the ludicrous, which does not spare even himself.

Mr. Thomson's route lay westwards from Mombassa to Kilimanjaro, which he traversed on nearly every side. Here he stayed for some time, ascending a considerable distance towards the Kimawenzi summit. For this magnificent mountain is really double-peaked, the highest summit, Kibo, reaching a height of over 18,610 feet, and Kimawenzi only about 2000 feet lower. The scenic features of the mountain were described in some detail in our columns recently in the paper read by Mr. Johnston at the Geographical Society, in which also its botanical and zoological characteristics were well brought out. Kilimanjaro, Mr. Thomson tells us, may be described as a great irregular, pear-shaped mass, with its major axis in a line running north-west and south-east, the tapering point running into the heart of the Masai country. On this line it is nearly sixty miles long. Its minor axis, running at right angles, reaches only to some thirty miles. The mountain is divided into the great central mass of Kibo and the lower conical peak of Kimawenzi. Towards the north-west it shades away into a long ridge, which gradually tapers horizontally and vertically till it becomes merged in the Masai plain. As to the geological story of the mountain, Mr. Thomson works it out thus:—

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[1] "Through Masai Land; a Journey of Exploration among the Snowclad Volcanic Mountains and Strange Tribes of Eastern Equatorial Africa." By Joseph Thomson, F.R.G.S. (London: Sampson Low and Co., 1885.)

"Let me try to trace the sequence of events which have produced Kilimanjaro. An examination tells us that in the serrated peak and rugged sides of Kimawenzi we see the original volcano, which, without doubt, existed long before there was a trace of its neighbour Kibo. Kimawenzi, after the imprisoned earth-forces found vent, rose in size and grandeur, added layer after layer to its height and circumference by a continual alternation of lava sheets and beds of agglomerate and tuff. It appears probable that it welled or belched out its contents without any of those terrific outbursts by which whole mountains are blown into the air or enormous areas submerged under a molten flood; for, curiously enough, we find no evidence that any of its lava-flows ever extended beyond the base of the mountain, or ashes accumulated to any depth in the surrounding country. At the present day the metamorphic rocks are seen to crop out at its very base on the east and south-east, and we have no reason to suppose that they ever were covered by lava rocks. As this—for a volcano—gentle accumulation went on, the hypogene agents would have more and difficulty in forcing the lava up the now elongated vent or orifice, and a time would come when the weight of the column would, in the end, balance the strength of the forces below. We can now imagine the terrible struggle that would ensue as the pent-up gases laboured mightily to relieve the pressure. Doubtless for a time they would succeed occasionally in clearing off the incubus and getting temporary outlet. At last even that would fail, and the volcano was doomed either to become extinct or find another vent. After some grand convulsions the latter was effected, and a new volcano began its existence to the west of Kimawenzi. In process of time it soon rivalled its neighbour in size, and finally towered above it, battering Kimawenzi's hoary head—probably then snow-capped—with showers of stones, and even threatening to obliterate it under the volcanic ejections. Meanwhile Kimawenzi, now no longer under a reign of fire, with its volcanic life-work finished, began, like all things earthly, to crumble away before the slow-boring influence of apparently puny agents. Rain, snow, and frost worked on insidiously but steadily, and soon told their usual tale of denudation as they gradually loosened and washed away the loose ashes which formed the crater, undermined the more compact lavas, and hurled them to the bottom of the mountain; until finally the solid core which had originally choked the orifice stood out a shattered, weather-beaten pinnacle with only a slight indentation to mark the line of the original crater The beautiful concave curve, so characteristic of large volcanoes, is still to be seen from the east, and speaks of the once handsome proportions of Kimawenzi.

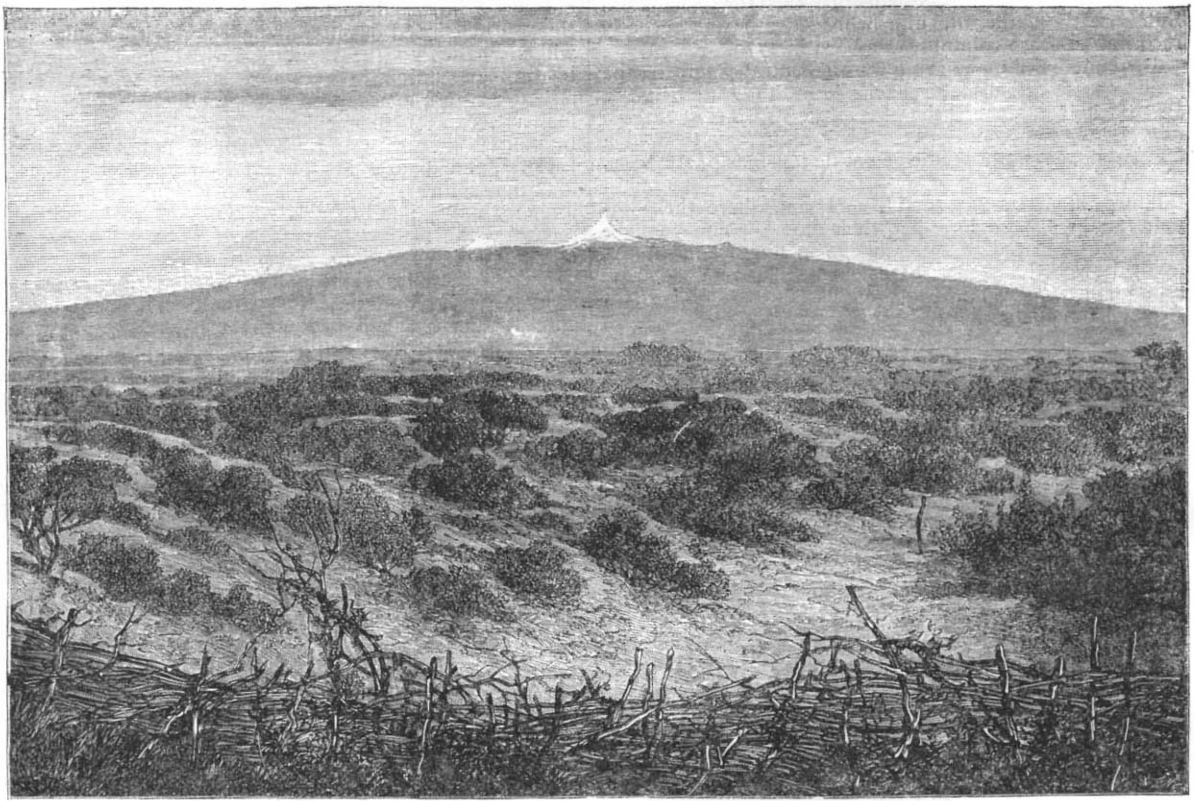

FIG. 1.—Mount Kenia from the West.

"The fate which befell Kimawenzi soon came upon Kibo. A height was reached which baffled all the attempts of Vulcan to raise the lava to the surface, and, like the other, it became extinct. Evidently, however, the imprisoned forces had either spent their original strength, or they frittered away their terrible energies in the production of numerous parasitic or secondary cones, instead of uniting in another grand effort and producing a third great volcano.

"These cones were spread in great numbers all along the southern side of Kibo and Kimawenzi, and set themselves to the task of strengthening or buttressing them up. An enormous mass of lavas and agglomerates was belched forth, resulting eventually in the formation of what I have called the Chaga terrace or platform, and the long ridge which penetrates far into the Masai country.

These manifestations of volcanic energy were continued far into what, geologically speaking, are recent times, and the geologists may view the small cones in many instances as perfectly preserved as when they were at work.

"The most interesting relic of the reign of fire is presented by the beautiful crater lake of Chala, which lies a short distance to the east of the base of Kimawenzi, and only a few miles north of Taveta. It represents probably the latest manifestation of energy, extending indeed into historical times, as the natives have a tradition that at one time a great Masai village stood on its site and was blown into the air, and they will now tell you that at times you may still hear from its liquid depths the lowing of cattle and the bleating of sheep, as well as other village sounds. The shape of the lake is that of an irregular polygon, about two miles in diameter and little short of six miles in circumference. It occupies the centre of a small hill with very irregular rim, 400 feet above the eastern plain at its lowest point, and quite 800 at its highest, where it runs up into a peak. The outer slopes are formed by beds of lapilli and tuff, which incline away all around at the same angle as the hill itself. Internally the lake is bounded by perfectly perpendicular cliffs without a break at any point, at least as far as I could discover, though the natives of Taveta say there is a place where the descent can be made; indeed, its discoverer, New, declares that he reached the water, and drank of it. I went all around it, and though I am not deficient in enterprise or nerve, I saw no place where I dare descend, not even though I could have swung from creeper to creeper like a monkey."

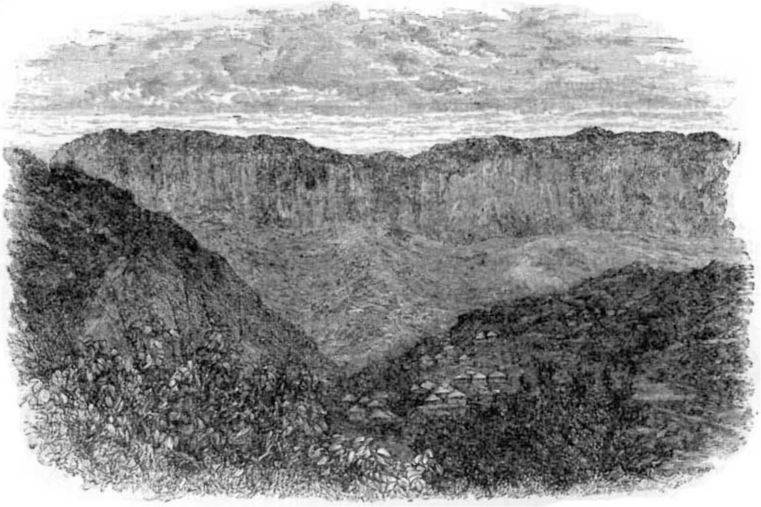

FIG. 2.—Lava Cap,' Elgeyo Escarpment.

From Kilimanjaro Mr. Thomson proceeded in a northerly direction, through the heart of the Masai country, to Lake Baringo, making a detour eastwards to Mount Kenia, which in some respects is even more interesting than Kilimanjaro. From Lake Baringo he proceeded as far westwards as the north-east shore of Victoria Nyanza, not many miles from the outlet of the Nile; then north to some strange artificial caves on the south face of Mount Elgon or Ligonyi (14,000 feet), and by Mount Chibcharagnani (12,000 feet), back to Baringo, and so south-eastwards to the coast, following a more northerly route after passing Lake Naivasha, which is just about half-way between Kilimanjaro and Lake Baringo. Of course this excellent piece of work was not accomplished without many trials and sufferings. The fierce and warlike Masai threatened many a time to eat Mr. Thomson and his men up, and it was only by the most wonderful tact and patience that the expedition succeeded in accomplishing its work without loss of life. The Masai

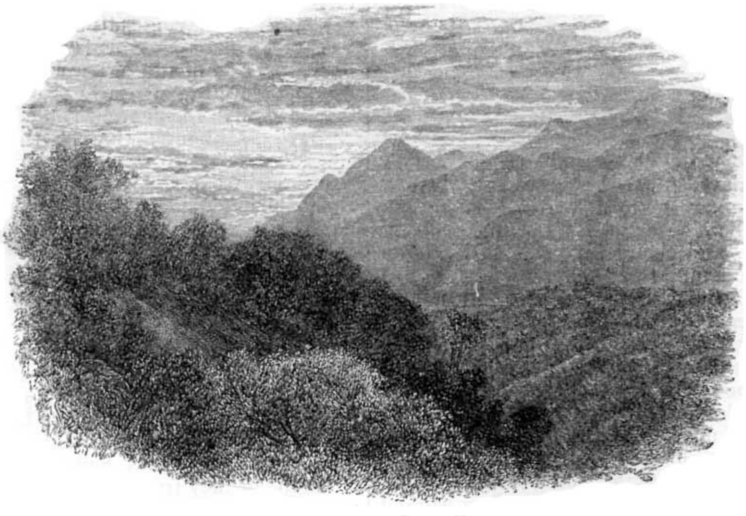

FIG. 3.—Glen of the Guaso Kamnyé.

are notorious cattle-lifters and great breeders, but their herds were dying by thousands of some mysterious disease, and it was only when at its last gasp that an animal could be bought, its carcase when cut up being loathsome. It was no wonder, then, that Mr. Thomson suffered dreadfully from dysentery, and a less determined man might have succumbed entirely. Yet Mr. Thomson cannot sufficiently express his admiration for a people whom he regards as the Apollos of Africa. Their physique, their language, their habits, their bearing, differ entirely from those of any other African race, though there seems little doubt that they are, by language at least, allied to the Gallas. Indeed, their own traditions point to a Galla origin ; they seem to be intruders into the region between Kilimanjaro and Kenia, which is now entirely dominated by them. They are certainly not a pure race, and scattered among them are remnants of a different people, who are the pariahs of the country. Their intelligence is above that of the average African, as is indicated by the dimensions of their skulls as well as by their organisation and general bearing. Their social habits are much what we find among other races of their stage of civilisation : "morality" begins only after marriage. All the unmarried men belong to the warrior class, and are permitted to use none other than animal food. Their spears, of native make, are of enormous dimensions, and their war costume is elaborately ludicrous. One strange custom is that spitting is the greatest mark of distinction you can bestow upon a Masai, and Mr. Thomson was often sorely exercised when he desired to be particularly conciliating and gracious in his intentions. This custom is, however, not without parallel : the natives of part of the southern coast of New Guinea, indeed, improve upon it by squirting mouthfuls of water on those to whom they wish to give a specially friendly welcome. What is the particular significance of the custom perhaps those who have investigated the subject of salutations may be able to explain.

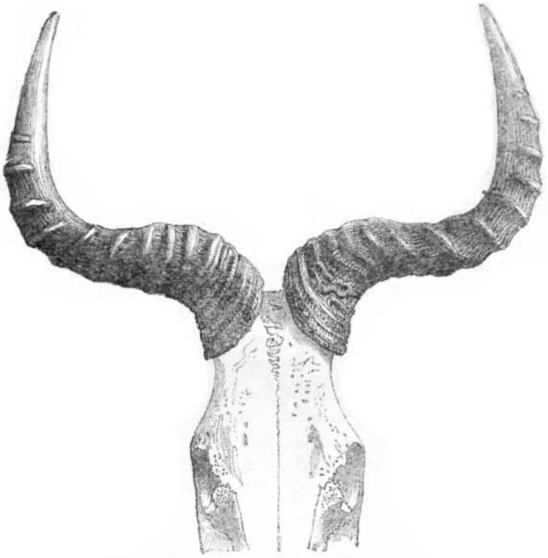

FIG. 4.—*Alcelaphus Cokii.*

As to the country itself through which Mr. Thomson passed, while part of it is desert, simply from want of water, much of it is rich in grass and forest, abundantly watered, and with a wealth of varied scenery scarcely surpassed in some of the favourite tourist resorts of Europe. Besides the two prominent mountain summits, there are several ranges of varying height, one of the loftiest and most attractive being to the south-west of Mount Kenia, and to which Mr. Thomson loyally gave the name of Lord Aberdare. "The Masai country," Mr. Thomson tells us, "is very markedly divided into two quite distinct regions, the southerly or lower desert area, and the northerly or plateau region. The southerly is comparatively low in altitude, that is to say, from 3000 to nearly 4000 feet. It is sterile and unproductive in the extreme. This is owing, not to a barren soil, but to the scantiness of the rainfall, which for about three months in the year barely gives sufficient sustenance to scattered tufts of grass. The acacia and mimosa have almost sole possession of those dreary plains, except near the base of some isolated mountain or other highland, where small rivulets trickle down, to be speedily absorbed in the arid sands. No river traverses this region, and many parts are covered with incrustations of natron, left by the evaporation of salt-charged springs. We have seen something of this lower region in the flat reach of Njiri, and the forbidding desert of Dogilani. It is not, however, to be conceived as a monotonous level. Far from it. The colossal Kilimanjaro and the conical Mount Meru belong to it. The hills of Gelei and the Guaso N'Ebor circle round in the form of an amphitheatre, to meet the metamorphic masses of Ndapduk and Donyo Erok. Further to the west and north are the volcanic masses of Donyo Engăi, Donyo la Nyuki, and Donyo Logonot, with the hills of Nguru-ma-ni. Except in the immediate vicinity of the higher mountains, such as Mount Meru and Donyo Engăi, the country is to a large extent uninhabited. To summarise this tract we may say that it is triangular in general shape, the apex towards the north reaching to within thirty miles of the equator, and extending beyond to Baringo as a species of trough or deep irregular cutting. The Masai are only to be found at all seasons about such favourable situations as the base of Kilimanjaro, Mount Meru, Ndapduk, Gelĕi, Kisongo, to the west of Meru, Donyo Engăi, and along the edge of the plain at the bases of the bordering highlands Maū and Kaptè. The country is sufficiently characterised when the fact is stated that it is a region of later volcanic activity, which in a very recent geological period has produced the cones and craters already referred to. These results of volcanic energy may, to some extent, be accounted for—though the statement may seem to savour of reasoning in a circle—by the lower region as an area of depression having subsided or sunk from the higher level of the flanking table-lands. The northerly or higher plateau region of Masai Land may be described as rising from an elevation of nearly 5000 feet on either side, and culminating in the centre at an elevation of little short of 9000 feet—although through this very line of highest elevation runs from the Dogilani plain the remarkable meridional trough which incloses the charming chain of isolated lakes, Naivasha, Elmeteita, Nakuro, and Baringo ; and which, at the last-named place, begins to widen out till it assumes the characteristics of the southerly plain of Masai Land. On the eastern half of this divided plateau rises, as we have seen, the snow-clad peak of Kenia—and the picturesque range of the Aberdare Mountains, which runs almost parallel with the central line of depression. A more charming region is probably not to be found in all Africa, probably not even in Abyssinia. Though lying at a general elevation of 6000 feet it is not mountainous, but extends out in billowy, swelling reaches, and is characterised by everything that makes a pleasing landscape. Here are dense patches of flowering shrubs ; there noble forests. Now you traverse a park-like country enlivened by groups of game ; anon, great herds of cattle, or flocks of sheep and goats are seen wandering knee-deep in the splendid pasture. There is little in the aspect of the country to suggest the popular idea of the tropics. The eye rests upon coniferous trees, forming pine-like woods, and you can gather sprigs of heath, sweet scented clover, anemone, and other familiar forms. In vain you look for the graceful palm—ever present in the mental pictures of the untravelled traveller. The country is a very network of babbling brooks and streams—those of Lykipia forming the mysterious Guaso Nyiro; those of Kikuyu the Tana, which flows to the Indian Ocean through the Galla country; while further, south, in Kaptè the streams converge to form the Athi River, which flows through U-kambani to the Sabaki River."

Here is Mr. Thomson's account of his observations on Mount Kenia:—"We were now at an altitude of 5700 feet, which may be taken as the general level of the plain from which Mount Kenia rises. Kenia itself is clearly of volcanic origin, and may be considered to be a counterpart of the Kimawenzi peak of Kilimanjaro. Unlike Kilimanjaro, its volcanic forces have not changed their focus of activity, and hence it now stands as a simple undivided cone. Up to a height of 15,000 feet (9000 feet above the plain) the angle of slope is extremely low, being in fact only between 10° and 12°, a fact which would seem to show that the lavas ejected must have been in a much more liquid condition than those of Kilimanjaro. The angle in the latter is much higher, indicating that the ejections were more viscid, and consequently did not flow so far from the orifice. At an elevation of over 15,000 feet the mountain suddenly springs at a high angle into a a sugar-loaf peak, which adds a further height of about 3400 feet. At the base of the peak two small excrescences are noticeable, and some distance to the north there rises a humpy mass. This peak, as in the case of Kimawenzi, without a doubt represents the column of lava which closed the volcanic life of the mountain, plugging or sealing up the troubled spirits of the earth. The crater has been gradually washed away—having been composed, doubtless, of loose ashes and beds of lava, and now the plug stands forth, a fitting pinnacle to the majestic mass below. As at Kilimanjaro, nature has appropriately woven for its grim head a soft crown of eternal snow, the cool, calm shining of which is at once a wonderful contrast and a strange close to the mountain's fiery history. The sides of this upper peak are so steep and precipitous that on many places the snow is quite unable to lie, and in consequence the rocks appear here and there as black spots in the white mantle. Hence its Masai name of Donyo Egèrè (the speckled or gray mountain). The snow covers the whole of the upper peak, and extends some distance on either side, reaching, and indeed including, the humpy mass on the north. The peak is strikingly suggestive of an enormous white crystal or stalagmite, set upon a sooty basement, which falls away gradually into the dark emerald green of the forest region round the base."

On the north side of Mount Kenia very few streams have their origin, though on the south side they are said to be abundant. It is still more unaccountable that, except on the south side of Mount Kilimanjaro, not a stream trickles down the snow-capped mountain, a phenomenon which only actual exploration can account for. One of our illustrations (Fig. 2) shows a great lava-cap in the Elgeyo Mountains to the west of Lake Baringo. In a running survey such as Mr. Thomson made, minute observation is of course impossible; but with his experience as a field geologist and his general caution, we may accept his geological map of the region lying between Victoria Nyanza and the coast as in a general way representative of the facts. Along the coast at Mombassa we find a strip of Tertiary rocks, succeeded westwards by a broad band of Carboniferous. West and north west of this is a great area of metamorphic rocks, having their counterpart further westwards on the east side of Victoria Nyanza. Between them, in three irregular strips, lie the earlier and later volcanic series, the mass of Kilimanjaro winding its way into the metamorphic, and Kenia lying on the northern edge of the latter. That volcanic activity is not quite extinct is shown by the fact that in the Kenia region hot springs and pools are met with, and the natives have a tradition that on the site of Lake Chala, on the east side of Kilimanjaro, once stood a large and populous town.

Thus Mr. Thomson has been able to fill up in a very satisfactory manner a considerable blank on the map of Africa. He has moreover established the fact that Baringo is a distinct lake, and that the east shore of Victoria Nyanza trends much more to the north-west than we find it on Mr. Stanley's map. The combined observations of Mr. Thomson and Mr. Johnston are a valuable addition to a scientific knowledge of one of the most interesting regions of Africa.

NOTES

MANY of our readers will be pleased to learn that M. Charles Feil has, after some years' absence, returned to the active management of his celebrated manufactory of optical glass in Paris, the new firm being "Feil père et Mautois." M. Charles Feil, who is well known both for his scientific and business abilities, is grandson to M. Guinaud, who, some sixty years since, in a mode of working almost identical with that adopted by the celebrated potter Palissy, overcame the serious obstacles which occur in securing the perfect homogeneity of both crown and flint glass, and whose secrets have descended to his grandson.

IT is with great regret we announce the death, on the 7th inst., of Mr. Edward Caldwell Rye, Librarian to the Royal Geographical Society, after a very short illness, from small-pox, aged about fifty-two years. In natural history he specially made his mark as an entomologist, and for a long time was the chief authority on British beetles, on which subject he was the author of a volume in Lovell Reeve and Co.'s series of popular works on British Natural History. For several years he contributed the article "Coleoptera" to the *Entomologists' Annual*, and he was one of the editors of the *Entomologists' Monthly Magazine* from its commencement in 1864. Furthermore he was for some years on the staff of the *Zoological Record* as a contributor, and since the 10th volume of that useful publication he had been sole editor. Nowhere will his nearly sudden death be more felt than at the Royal Geographical Society, for, in addition to his ordinary duties as Librarian, that of editing the bibliographical portion of the *Proceedings* devolved upon him. Mr. Rye married a daughter of Mr. G. R. Waterhouse, of the British Museum, who, with four children, all young, survives him; and, if report be true, they are left almost unprovided for. He was a Fellow of the Zoological Society, a member of the Entomological Society of London, and the Recording Secretary of Section E at the meetings of the British Association.

WE regret to announce the death, at Paris, on February 1, at the early age of thirty-four, of Mr. Sidney Gilchrist Thomas, to whom is mainly due the basic Bessemer process. Born in 1850, he entered the Civil Service, but from his youth showed a taste for science, and especially metallurgy. The project of eliminating phosphorus by the Bessemer converter soon occupied all his attention, and, after numerous experiments at Blænavon, in 1877 he took out his first patent, and communicated his invention to the Iron and Steel Institute in a paper read at the Paris meeting in 1878.

THE Minister of Agriculture in Canada has just declared the Bell telephone patent void in the Dominion, the occasion being a double infraction of the Canadian law by the Canadian Telephone Company. It appears that the Company imported telephones after the expiry of two years from the date of the patent, and that it also refused to sell instruments to the public, demanding annual rentals for the lease, as in this country and in the States. Both these acts contravene the Dominion law.